INSTALLATION- AND MAINTENANCE MANUAL

Akvasmart Rotor Spreader

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For a thorough introduction of Your AKVA product, we ask that all users read this entire manual. If questions occur, contact us!

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Table of contents

1 Safety 4
1.1 Safety symbols 4
1.2 General 5
1.3 Personnel safety 6
1.4 Equipment safety 6

2 Information 7
2.1 How to use this manual 8
2.2 About AKVA group 9
2.3 About Akvasmart Rotor Spreader 10

3 Assembly 11
3.1 Necessary assembling equipment 11
3.2 Buoy for buoyancy 12
3.3 Weight for stability 13
3.4 Bearing for even rotation 14
3.5 Outlet pipe 14
3.6 Ready for connecting to the feeding system 14

4 Connect rotor spreader to feeding line 15
4.1 Procedure 15
4.2 Adjusting the rotor spreader 16

5 Placing Akvasmart Rotor Spreader in the cage 15
5.1 Procedure 15

6 Maintenance 18
6.1 Regular maintenance 18
6.2 Blockages inside the feeding system 19
6.3 Cleaning bearings 23
6.4 Spare parts 23
6.5 Registration of maintenance 24

Appendix A - Index 25
Appendix B - Deviation form 26
Appendix C - Notes 27
Appendix D - Contact information 29

1 Safety

Safety for the users of our products, is main focus when developing new products and user manuals in AKVA group.

Therefore, we strongly recommend that everyone that is going to be using it, carry out repairs, service and maintenance on the product, as well as everyone working in the area where the product is installed or being used, reads this entire manual, and especially this safety chapter.

This recommendation is based on both personnel safety, as well the desire to keep the products in order as long as possible, by avoiding any damages risked if the safety instructions are not followed.

1.1 Safety symbols

These safety symbols are used in this manual:

Information

Show caution, danger of minor personnel injuries and damages to equipment

Warning - may cause personnel injuries

Danger! - Will cause dangerous situations and danger for personnel

1.1.1 Other symbols used in this manual

Go to or see page or chapter for further instructions or more information

1.2 General

This manual describes how to install and maintain the Akvasmart Rotor Spreader. AKVA service personnel will execute any remaining tasks. Only when written consent from an AKVA employee exists, is it possible for others to execute these.

1.3 Personnel safety

Farm owner where Akvasmart Rotor Spreaders are installed, is responsible for complying applicable safety laws and regulations in the current country, such as correctly designed and installed safety devices. Farm owner is also responsible for that all employees are informed about and understand the content of this manual. All users of this product must know about:

- How the Akvasmart Rotor Spreader works with the rest of the feeding system
- Which safety considerations that must be taken regarding installation, use, maintenance and other task with and around the rotor spreader
- How the Akvasmart Rotor Spreader works and how to use it
- How to maintain the Akvasmart Rotor Spreader according to procedures described in this manual.

Owner and farm manager are responsible for that all personnel working with or around the Akvasmart RotorSpreader read and understand the entire content of this manual, especially dangers and consequences related to misuse.
To prevent personnel injuries and equipment damages during installation, maintenance and repairing processes, it is crucial that all instructions provided in this manual are followed. All applicable safety laws and regulations in the country where the equipment is installed must be complied.

Personal safety equipment, such as antiskid foot wear and floating garments, are mandatory to wear when working on and by the cage, for instance when working on the rotor spreader.

Troubleshooting must, on some occasions, be carried out with power turned on. At such occasions, it is very important that all personnel staying around this (and other rotating equipment), wears appropriate safety gear, minimum helmet and floating garments. To ensure safe operations, perform all tasks according to descriptions in this manual.

As a main rule power for the entire feeding system must be turned off and secured in off position during any work, such as installation, maintenance and repairs.

1.4 Equipment safety

Check all equipment after periods of bad weather for damages. Make sure that all suspensions are intact, that surrounding equipment are ok, check nets especially. If any damages have occurred, they must be repaired at once, contact AKVA group for assistance if needed.

Make sure that all parts are delivered according to the service note. If the order is not complete, or if any defects are discovered, contact AKVA immediately.

If any of the equipment, ropes or other belonging parts are being moved to a new location, it is decreed by law to disinfect everything to prevent contamination. We recommend rinsing with fresh water after disinfection, because the disinfectants are strong chemicals that may damage the surface materials.

Contact information is found in the back of this manual.

2 Introduction

This user manual is part of the equipment delivered with Akvasmart Rotor Spreader. Keep the manual for as long as the rotor spreader is used, and make sure that all changes to the equipment are being noted in the back of this manual.

Thank you for choosing AKVA group ASA as supplier for your feed spreader. Do not hesitate contacting us for more information regarding installation, use or maintenance for Akvasmart Rotor Spreader or any other AKVA product.

The purpose of this manual is to make the user install and maintain Akvasmart Rotor Spreader in a safe and economical way. The manual will show how to install and maintain the product, as well as hopefully answer most day to day questions. If there is anything relevant this manual does not explain or answer, please contact us for assistance and help to find a solution to any problems. Contact the AKVA service department, your subcontractor, your local AKVA office or our main office in Norway for assistance and help.

2.1 How to use this manual

This manual describes how to install and maintain the Akvasmart Rotor Spreader in the best and safest possible way. This entire manual must be read and understood by ALL users prior to installation of the product. Site owner and farm manager are responsible for training all personnel and users know and make sure they all understand the contents of this manual.

Before the first chapter, is the table of contents. The headlines works as links to their respective chapter in the .pdf-file.

Chapter 1 is the most important chapter of this manual, and includes safety precautions ensuring safest possible use.

Chapter 2 contains information on AKVA group and Akvasmart Rotor Spreader, as well as this manual instruction.

Chapter 3 describes assembling of the Rotor Spreader, and how to connect to the feed system is explained in chapter 4. Installation of the Rotor Spreader inside a cage is described in chapter 5, and maintenance and safety regulations for searching for and removing of pellet blockages inside the rotor spreader are described in chapter 6.

Four appendixes are found in the back of the manual: Index, with links to the rest of the manual in the .pdf-document, a deviation form for all deviations with the system, pages for notes about new and extra information are also in the back of the manual and AKVA contact information.

This entire manual must be read and understood, as well as used as aid during installation and maintenance of the Akvasmart Rotor Spreader

2.2 About AKVA group

With four main brands, AKVA group ASA is a world leading supplier of technical aquaculture equipment. Since 1980 we have developed and produced fish farming equipment, both for cages at sea and for land based hatcheries. AKVA represents an industrial standard, which is presumed to be the turn key to the future. Research, project management, fast deliveries and customer follow-up have been our focus to ensure that we contribute to a positive development within the agriculture industry. Our goal is to deliver the best possible and most cost efficient equipment in order to keep preserving sustainable farming.

We have a wide variety of products, for example: plastic and steel cages, high pressure washers, net washers, boats, feed barges, feeding systems, cameras, sensor systems, under water lighting, software for fish farming and recycling systems.

AKVA has a continuous development of products, and we continue to improve product safety, functions, range of use and reliability. The purpose of this manual is to enable users to install and maintain Akvasmart Rotor Spreader in a safe and economic way.

All of our equipment is pre-installed, tested and delivered from our own production department. This means that our customers have total control over which components you can choose from, grouping collocation, testing and deliveries. Our production staff consists of people with great expertise and engagement for producing the best possible products. Having our own production site provides excellent service in case something should go wrong, or if assistance is required. Our service staff is available over telephone or on location to assist whenever necessary. Safety, both for users and equipment is main focus when AKVA group develops products and product manuals.

2.3 About Akvasmart Rotor Spreader

One of the most important factors for gentle feed handling is regulating transport air speed. "Speed kills" also when it comes to feed systems, and reduction of transport air speed provides significant reduction in feed dust and pellet breakage. Using the Air Control System combined with the highly effective, low friction start Rotor Spreader allows reduction in air speed while still getting excellent feed spread.

The unique Rotor Spreader is designed to provide excellent feed spread in cages. All our models have adjustable light weight aluminium rotor pipes that allow for lower air speed for start up and rotation. This means less dust and breakage, power consumption, back pressure, air temperature, noise and wear and tear on the feed pipes.

Our unique ventilated Zenon bearing requires no regular cleaning and does not corrode. Due to its light displacement and low point of gravity versus centre of buoyancy, the Rotor Spreader is very stable in rough seas.

Technical specifications:

Rotor Spreader	RS-63C	RS-90C	RS-110C
PE pipe dimension:	63mm (2")	90mm (3")	110mm (4")
Max pellet size:	12mm (1/2") *	25mm (1") *	25mm+ (1") *
Recommended RPM:	50-100 *	50-100*	50-100 *
Spread diameter (adjustable):	Approx. 4-12m Ø * Approx. 12-40' Ø *	Approx. 5-18m Ø * Approx. 16-60' *	Approx. 5-18m Ø * Approx. 16-60' *
Materials:	Stainless Steel/Alum. Rotor/POM (Delrin) Polyform buoy	Stainless Steel/Alum. Rotor/POM (Delrin) Polyform buoy	Stainless Steel/Alum. Rotor/POM (Delrin) Polyform buoy
Height above water:	1,2m (4')	1,2m (4')	1,4m (4'6")
Draft:	1,8m (6')	1,8m (6')	1,8m (6')
Total weight:	Approx. 30kg (66 lbs.)	33kg (73 lbs.)	38kg (84 lbs.)

* Depending on feed system and feed type

3 Assembly

Read through this entire manual, and be sure that you understand the contents properly before the assembling is commenced

Make sure that all parts are delivered according to the service note

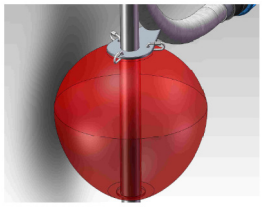
The assembling must be done on shore or in the barge/on a boat

3.1 Necessary assembling equipment

- A compressor for inflating the buoy
- A knife for removing any burrs in the buoys center opening
- A tape measure for measuring the buoys centerline circumference
- Two M10 spanners/wrenches for fastening the weight bolts
- One M6 hex key for fastening the bearing
- A screwdriver for fastening the outlet pipe hose clamp
- A large set of pliers to fasten the union house that connects the rotor spreader to the feeding pipe

3.2 Buoy for buoyancy

Thread the flat buoy onto the weight pole. The air nipple must point upwards.

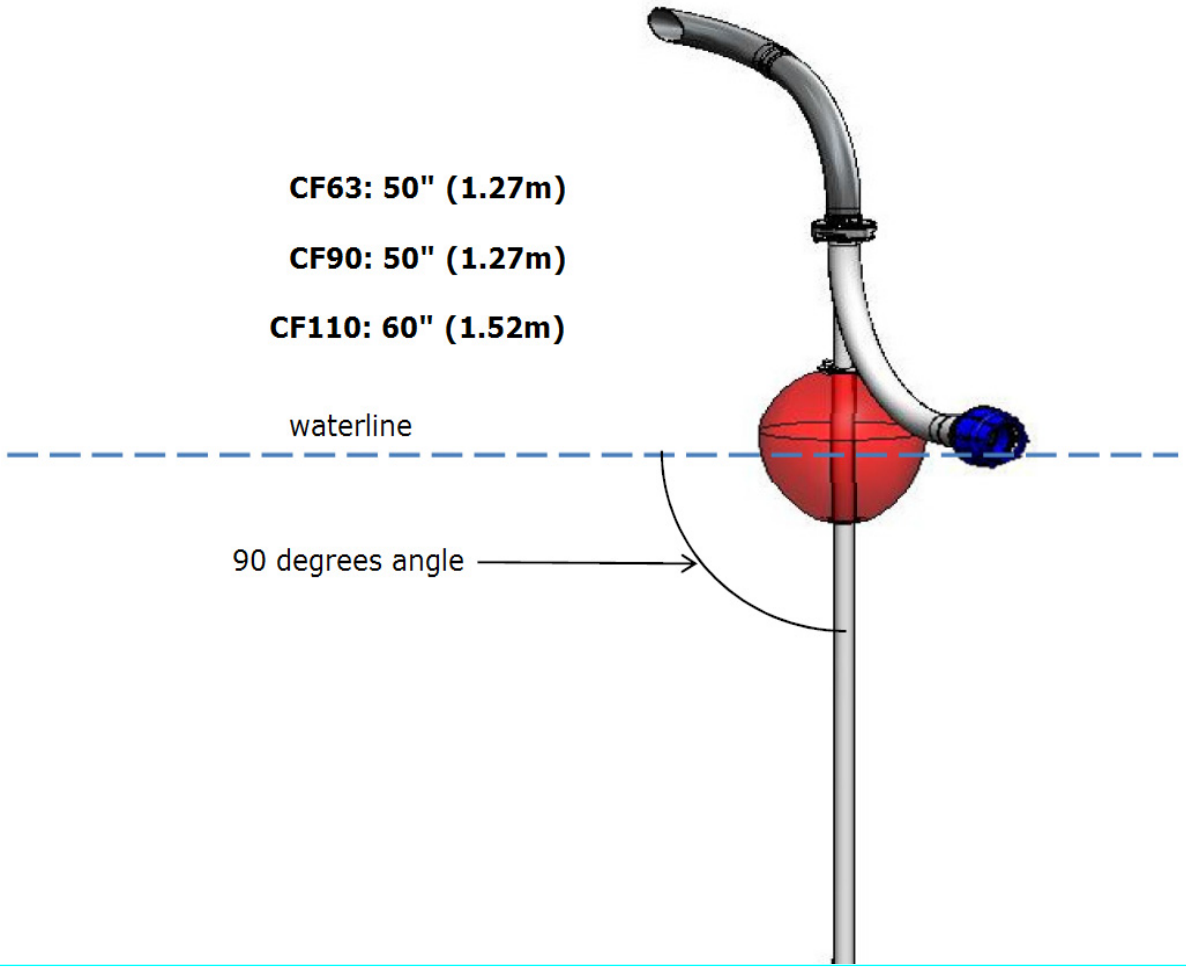


If this is difficult, carefully remove any burrs around the opening of the buoy center hole with a knife.

Inflate the buoy with a compressor. The buoy is properly inflated when the centerline/split-line has a circumference of:

- CF63: 50” (1.27m)
- CF90: 50” (1.27m)
- CF110: 60” (1,52m)

These values make sure that 50% of the buoy is above water and 50% below water, only with these proportions the rotor spreader stands with a 90 degree angle in the water surface. Remember that the buoy and the bottom stability weight is the only buoyancy force of the rotary spreader.



3.3 Weight for stability

The Akvasmart Rotor Spreader may be delivered with stability weight cover with rounded edges to protect the net from the weight. This cover is assembled before the stability weight, or any time after, but then the weight needs to be removed first.

3.3.1 Assembling stability weight (without protection cover)

1 Align the stability weight hole with the weight pole hole

2 Insert the M10x80 Allen bolt

3 Lock with the M10 nut.

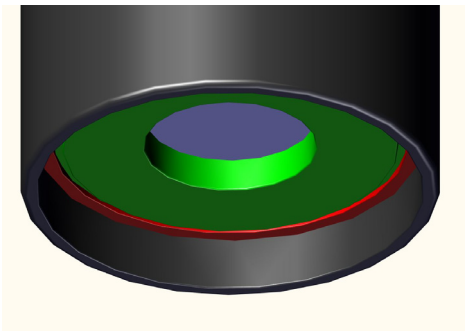
3.3.2 Assembling stability weight with protection cover

1 Tread the protection cover far up the rotor spreader pole

2 Follow the instructions in chapter 3.3.1 (above)

3 Place the lid (the green part in the image below) in the opening of the bottom of the protection cover

4 Fasten the lid by inserting the lock ring (the red part in the image below).



3.4 Bearing for even rotation

1 Attach all 3 M8 Allen screws before tightening

2 Tighten the bolts one by one to maximum 6Nm.

! *If these are overtightened, the bearing house will bend and the bearing will become useless.*

3.5 Outlet pipe

Use the hose clamp to lock the outlet pipe in desired position.

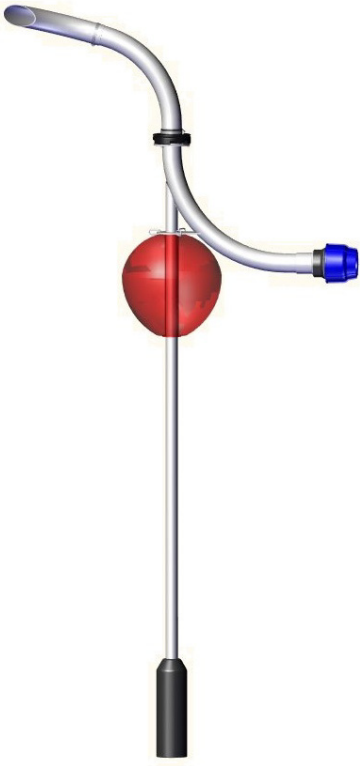
The spread area is adjusted by the outlet pipe:

- pointing it downwards reduces the spread area
- pointing it upwards increases the spread area

3.6 Ready for connecting to the feeding system

The Akvasmart Rotor Spreader is now ready to be taken out to the cage edge.

Continue to chapter 4 for instructions on how to connect it to the feeding pipes and the rest of the feeding system.



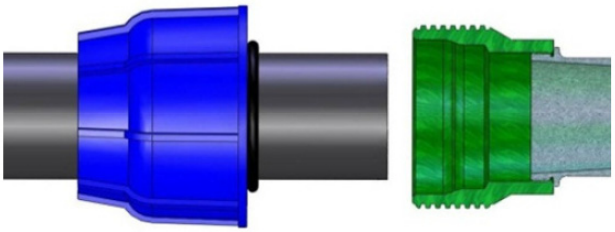
4 Connect rotor spreader to feeding line

Personal safety equipment, such as antiskid foot wear and safety garments, are mandatory when working on and by the cage, ans for working on the rotor spreader

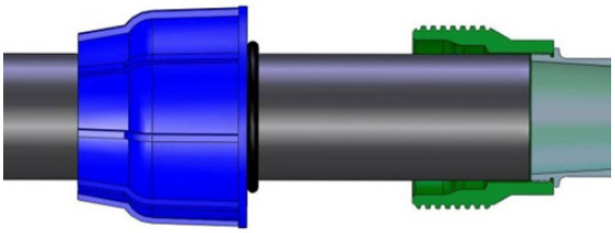
When the rotor spreader is connected to the feeding pipes, the feeding system main power must be turned off and locked in off position

4.1 Procedure

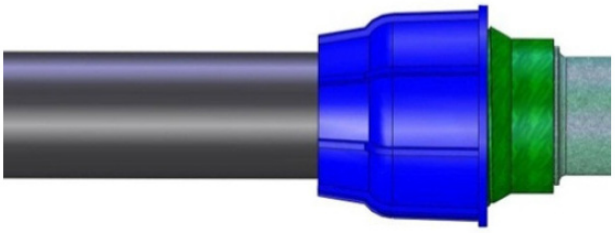
1 Place the rotor spreader next to the PE feeding pipe and hold it up as vertically as possible before connecting it to the pipe



2 Smear siliconc grease on the end of the feeding pipe end and inside the union house (green color) where the O-ring is being pressed in



3 Place the end of the feeding pipe in to the union house



4 Screw the union (blue color) into the union house using hand force firstly, then use pliers or a large spanner to tighten the connection.

4.2 Adjusting the rotor spreader

When the rotor spreader is dropped into the water, it will not align itself in the water, because of its light weight. The installer needs to proceed tentatively and adjust little by little to make the spreader angular to the water surface and by this, achieve best possible use for the rotor spreader.

After the rotor spreader is connected to the feeding pipe, it must be placed in the water and left there for a while to adjust.

If the rotor spreader does not stand vertically, it must be adjusted further.

Take it out from the water, and either:

- twist the union and twist the rotor spreader, or
- pull the weight in the bottom of the pole the opposite direction of the displacement

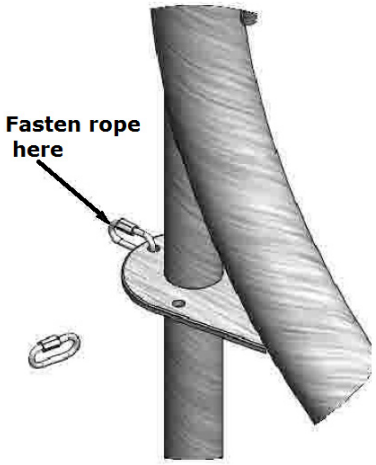
Repeat this process until the rotor spreader stays vertical in the water.

5 Placing Akvasmart Rotor Spreader in the cage

To obtain best possible spread of pellets inside the cage, we recommend placing the rotor spreader as centered as possible inside the cage ring or edges.

Three ropes fastened to the rotor spreader are used to keep it in place inside the cage. The ropes are not for holding the rotor spreader vertical, the buoy and the stability weight does this.

5.1 Procedure

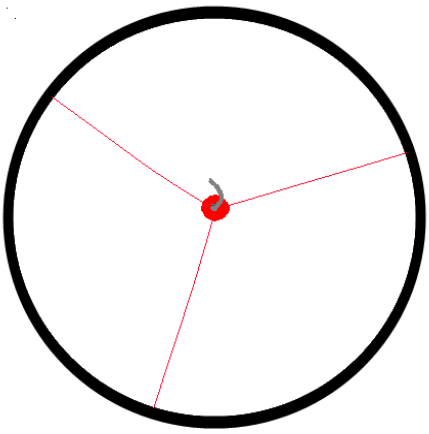


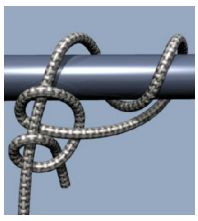
1 Tie each rope to safety hooks

2 Attach the safety hooks to the rotor spreader as shown in the figure to the left

3 Using the ropes, bring the rotor spreader to desired position

4 Fasten the ropes to the cage rail as shown in the figure:





We recommend using a rolling hitch knot when tying the ropes to the cage edge.

6 Maintenance

Remember to always turn the main power switch off and secure in locked position before any work done with the rotor spreader

Personal safety equipment, such as antiskid foot wear and safety garments, are mandatory when working on and by the cage, for instance when working on the rotor spreader

Regular maintenance on the rotor spreader bearing is important in order to maintain an even rotation during feeding.
AKVA group recommend bearing inspection minimum every sixth month. Clean and change when required.

Contact AKVA group Service if any questions occur that is not answered in this manual, or if it is desired that AKVA service personnel should perform maintenance to the rotor spreader or any other AKVA products.

6.1 Regular maintenance

Control the rotor spreader bearing every sixth month to make sure that it is not dirty or have contaminations inside. The bearing must also be controlled if it seems to be rotating slower than usually when all other parts of the feeding system are in order, as this may indicate that the bearing is contaminated. Follow instructions in chapter 6.3 for correct control, and clean or change bearing when required.

Register all performed maintenance in the form in chapter 6.5. Remember to make copies of this form before filling anything out.

6.2 Blockages inside the feeding system

If pellets are sent out from the dosers on the feeding line, but none come out of the rotor spreader outlet, when the feeding software is set to feed, this may indicate a blockage inside the system.

A blockage inside the feeding system will build up a severe internal air pressure inside this system. This pressure will not be set off when turning off the blower, and when the blockage is released, the pressured air will bring the pellets the easiest way out - through the rotor spreader outlet, with risk of creating a dangerous situation for persons staying around the rotor spreader. The compressed pressure must be neutralized as described in this chapter to avoid injuring personnel.

If no other causes for air and pellet stop are found in the software or other equipment, pipes, hoses and rotor spreader have to be controlled for pellet blockages as instructed in this chapter. When searching for blockages inside the rotor spreader parts for blockage, use either a rubber hammer and knock carefully to the pies making sure not to damage the materials, to hopefully release the blockage. The rotor spreader parts may be disassembled and checked by sticking a steel wire inside the pipes to locate the blockage, and then use the rubber hammer in the area to release it.

Such pellet blockages may easily be avoided by rinsing pipes and hoses daily with the AKVA Feed Pipe Cleaner and AKVA Sponge. Contact Your AKVA sales person or visit www.akvagroup.com for more information on these products.

- The main power may only be turned back on when the rotor spreader is disconnected from the feed hose and the end of the feed hose is attached to the cage edge with ropes or straps, with the end opening pointing in to the cage center, or if the rotor spreaders rotating parts are removed (from bearing and upwards), and no personnel are staying near the opening

- Nobody may stay near the opening of the rotor spreader or feed hose when the main power is turned back on. This also applies when the rotating parts are removed from the rotor spreader, because the pellets may shoot out with great power when the blockage is released and the pressure has not been neutralized

- If two or more people are working together with releasing a blockage, clear communication is crucial to avoid dangerous situations caused by mis-communication

- Only when a blockage is released, all equipment are re-assembled and all of the devices in the feed line are in order, the main power switch may be turned back on, and the feeding process may continue.

Procedure for releasing blockages

1 Control blower, doser and selector in the blocked feeding line. These may not be in order, and be the cause that no pellets exit the system. Repair if broken and control. If pellets are still staying inside the system, proceed to the next step

2 Control that the AKVAconnect is working as it should. If anything is found wrong here, contact AKVA service personnel for assistance

3 If software and remaining equipment are working as they should, start controlling the rotor spreader. First of all: turn off the feeding system's main power switch and secure it in locked position with a personal padlock

4 Neutralize the pressure inside the system by running the selector to an idle opening

5 Remove the top part of the rotor spreader from the rest by releasing the bearing. Control this part for blockage with wire and/or carefully knocking on the pipe with a rubber hammer

6 Release the rotor spreader from the feed hose by releasing the union. Do not drop the o-ring from inside the union into the water!

7 Control the rest of the rotor spreader with wire and/or carefully knocking on the pipe with a rubber hammer to locate the blockage. If the blockage is not inside the rotor spreader, the feed hose must be controlled

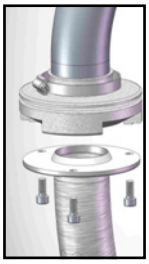
8 Attach the end of the feeding pipe to the cage edge rail, pointing it in towards the cage, with ropes or strips, to ensure that no personnel stays by the opening when the feeding system is started, and to make sure it stays in place during the test procedure

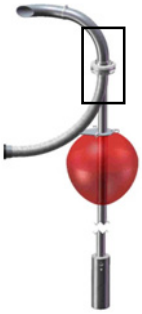
9 Use the rubber hammer around on the length of the pipe to release the blockage

10 Turn the main power back on, start the feeding system and activate the feed line blower with low air speed. Pellets and air will exit the hose if a blockage was located here, so make sure that someone observes the outlet when the blower is turned back on

11 If no blockage is found in the rotor spreader or the feed hose, contact AKVA service personnel for further inspections to find out what is stopping the pellets from exiting the rotor spreader.

6.3 Cleaning bearing





1 Turn the main power switch off and lock it in off position

2 Unscrew the 3 hex bolts, *and keep them in a safe place!* and remove the bearing. Clean the bearing in warm, mild degreasing soap water

3 If the bearing is OK, reattach it. Replace bearing if necessary

4 Reattach all 3 bolts before tightening. Then torque one by one maximum 6Nm. If the torque is too tight the bearing house will bend.

! *If the bolts are tightened too hard, the bearing house will bend*

6.4 Spare parts

Ball bearings

Expected life cycle is 600 tons of feed. Change the ball bearing preventively at 80% (480 tons) of this time to ensure the bearing 100% up time. Keep track in AKVAconnect to see when to change the ball bearings.

Aluminum pipes

The first pipe is connected to the bearing (spare part kit) and is therefor changed at the same interval as ball bearings (480 tons) The pipe outlet is changed preventively at 1000 tons of feed.

Contact AKVA group to order new parts for YOUR Akvasmart Rotor Spreader. Contact information is found in the back of this manual.

6.5 Registration of maintenance - Akvasmart Rotor Spreader

Make copies of this form before filling anything in

Date	Parameter description	Feed amount	Next maintenance	Signature

Appendix A - Index

A

adjust 14, 16

B

bearing 10, 11, 14, 18, 20, 21, 23

buoy 10-12, 17

F

feed hose 11, 14-16, 19, 20

H

hex bolt/key 11, 18, 20

M

main power 15, 18-20

O

outlet pipe 9, 12

P

personal padlock

personal safety gear

pliers 11, 15

S

safety hook 17

siliconc grease 15

spanners 11, 15

spread area 14

stability weight 12, 13, 17

T

tape measure 11

troubleshooting 6

U

union house 11, 15, 16, 21

Appendix B - Deviation form

Make copies of this form before filling anything in

Deviation control nr.:	

Unit:	**Producer:**	**Prod.no.:**	**Purchase year:**

Deviation description:
Follow up proposition:
Date and signature, declarer:

Follow up directed:
Status:
New action for deviation no.:
Date and signature, follow up:

Appendix C - Notes

Appendix D - Contact information

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f. +358 - 9867 68420

ICELAND

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